FLOOD HAZARD ANALYSES

ROYAL RIVER
TOWN OF YARMOUTH, MAINE

Prepared by
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
In cooperation with
CUMBERLAND COUNTY SOIL AND WATER CONSERVATION DISTRICT
MAINE SOIL AND WATER CONSERVATION COMMISSION
And
TOWN OF YARMOUTH, MAINE

October 1973

FLOOD HAZARD ANALYSES

ROYAL RIVER

TOWN OF YARMOUTH

CUMBERLAND COUNTY, MAINE

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, Section 6, in accordance with Recommendation 9 (c) of House Document No. 465, 89th Congress and Executive Order 11296.

Prepared By:

United States Department of Agriculture

Soil Conservation Service

In Cooperation With:

Cumberland County Soil and Water Conservation District,

Maine Soil and Water Conservation Commission,

and

Town of Yarmouth, Maine

October 1973

FORWARD

This report identifies and delineates flood hazard areas along the Royal River in the Town of Yarmouth. The purpose of this report is to assist the Town of Yarmouth identify local flood problems and promote the best utilization of flood plain lands. This report will assist the town to develop flood plain land use policy, adopt and enforce land use regulations, and provide public information.

The report is based on historical storm and flood information, stream flow records, and other technical data defining the size and occurrence of potential floods in this area. It provides the best current estimates of flood water elevations and areas that are prone to flooding under present conditions for the ten-, 100-, and 500-year frequency flood events.

The Maine State Soil and Water Conservation Commission provides leadership for this program and will provide interpretation and technical assistance in the application of the data presented herein. This report was prepared by the Soil Conservation Service, U.S. Department of Agriculture.

Appreciation is expressed for the assistance given by the following agencies and organizations throughout the study:

Corps of Engineers, Department of the Army
U. S. Geological Survey, Department of Interior
National Oceanic and Atmospheric Administration,
Department of Commerce.
Forest Service, Department of Agriculture
Town of Yarmouth, Maine

Appreciation is also extended to the many property owners who cooperated with the survey work connected with the study.

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FLOOD HAZARD ANALYSES

ROYAL RIVER - TOWN OF YARMOUTH, MAINE

Introduction

This report presents information regarding the flood hazard situation along the Royal River in the Town of Yarmouth, Maine It was prepared in response to a request from the Town of Yarmouth to the Maine Soil and Water Conservation Commission via the Threshold To Maine RC&D Steering Committee to assist the town develop a flood plain management program, ordinances, and regulations.

The Town of Yarmouth is experiencing an urbanization trend and recognizes that planning and management of the flood plain land is essential to orderly community growth The town recognizes that various users compete for each parcel of land including flood plains Encroaching onto the flood plain by land filling and other developments, which constricts the flow and reduces the storage of flood waters, increases flood water depths and the amount of area flooded. Urbanization increases the flood hazard by increasing the rate and amount of runoff through a decrease in infiltration due to compacted soils and the addition of pavements, roofs, and storm sewers.

In order to properly control flood plain development, it is necessary:

1 For state and local units of government to have appropriate technical information for use in flood plain management

2. For technical services to be available to managers of flood plain property for community, industrial, and agricultural uses.

3 To improve basic technical knowledge about flood plain hazards in cooperation with other agencies and groups.

In 1971 the State of Maine enacted the "Mandatory Zoning and Subdivision Control" Law (Chapter 424, Sec 4811 thru 4814 of the MaineStatutes) which requires all municipal units of government to adopt zoning and sub-division control ordinances for shoreland areas Shoreland areas are defined as land within 250 feet of the normal high water mark of any pond, river, or salt water body If a municipality fails to adopt zoning and sub-division controls for any reason, the Maine Department of Environmental Protection and the Maine Land Use Regulation Commission shall adopt suitable ordinances for that municipality. The law was revised by the Maine Legislature in 1973 to give the municipalities until June 30, 1974, to adopt the ordinances.

The Soil Conservation Service, United States Department of Agriculture, carries out flood hazard analyses under the provisions of Recommendation (9) (c) of House Document No. 465, 89th Congress, under the authority of Section 6 of Public Law 83-566, the Watershed Protection and Flood Prevention Act (1954) Priorities regarding location and extent of such studies in Maine have been set by the Maine Soil and Water Conservation Commission through a Joint Coordination Agreement reached between the Maine Soil and

Water Conservation Commission and the Soil Conservation Service, USDA, to furnish limited technical assistance to the State of Maine in carrying out flood hazard analyses. The request to conduct this study was based on the Agreement.

This report contains aerial mosaic maps, high water profiles, and typical valley cross sections which indicate the extent of flooding which might occur along the Royal River in the Town of Yarmouth. Three probable floods are outlined. They are the 500-year, the 100-year, and the 10-year frequency floods. The 500-year flood has a 0.2 percent chance of being equalled or exceeded in any given year, the 100-year flood has a 1 percent chance of being equalled or exceeded in any given year, although it could occur twice or more in the same year, and the 10-year flood has a 10 percent chance of being equalled or exceeded in any one year. Other frequencies were analyzed and are on file.

This report does not contain recommendations for the solution of local flood problems. It is intended to provide a technical basis for arriving at solutions to minimize flood damages. Such solutions could include the following non-structural means:

1. Land Use Planning
2. Flood Plain Control Regulations
3. Flood Plain Development Regulations
4. Flood Plain Filling Regulations
5. Flood Plain Zoning
6. Flood Plain Acquisition
7. Upstream Land Treatment Program
8. Flood Warning System
9. Flood Insurance

Structural measures which would complement the above include floodwater retarding structures and flood proofing. The watershed was studied by the Soil Conservation Service in 1965 as a possible Public Law 566 Watershed Protection and Flood Prevention Project. The study yielded a benefit-cost ratio of 0.4:1.0.

The Maine Soil and Water Conservation Commission, the Cumberland County Soil and Water Conservation District, and the Soil Conservation Service, U.S. Department of Agriculture, will, upon request, provide technical assistance to federal, state, and local agencies and organizations in the preparation and use of the information developed in this study.

Description of the Watershed

The Royal River Watershed has a drainage area of 142 square miles and lies in the eastern portion of Cumberland County with its northern quarter in Androscoggin County. Starting approximately five miles south of Auburn, the Royal River flows in a southerly direction through the Townships of New Gloucester, Gray, North Yarmouth, and Yarmouth into Casco Bay at Yarmouth. Yarmouth lies approximately 10 miles northeast of Portland, 25 miles south

of Lewiston-Auburn, and 115 miles north-northeast of Boston.

Dairying is the principal agricultural enterprise in the watershed. Much of the openland has lain idle and is now reverting to woodland. The areas serviced by good highways from the Lewiston-Auburn area are being urbanized. Some long abandoned areas throughout the watershed are now being resettled as seasonal and year-round residences. The topography of the watershed is rolling with elevations ranging from 625 feet on top of Shaker Hill down to sea level at Casco Bay.

The study area lies in the southern part of the watershed and is approximately three miles long. Five highway bridges and two railroad bridges span the Royal River in the study area. Table 1 on Page 4 lists pertinent elevations and shows the relationship to the 100-year flood for four of the highway bridges and the two railroad bridges. No information was obtained on the most downstream bridge (Interstate 95) which is amply high and over tidal waters. Two dams are located in this segment. Table 2 on Page 5 indicates pertinent elevations for these dams showing the relationship between the 100-year and 500-year floods. The "Inventory of Dams on Maine Waterways" report prepared by the Maine State Planning Office, Water Resources Planning Division, in April 1973, lists the lower dam as having seven feet of head and being in good condition. This dam is listed as being owned by Stulz Electric and is used for fire protection. It has a spillway length of approximately 155 feet. The upper dam is listed as having 12.5 feet of head and being in good condition. It is listed as being owned by the Glick Poultry Company and its use is not mentioned. It has a spillway length of approximately 195 feet. This dam creates backwater effects for approximately five miles upstream. Both of these dams were field checked in 1968 for their condition by the Maine Department of Sea and Shore Fisheries.

The portion of the Royal River within the study area is classified as being Class B-2 for fresh water and Class SB-2 for tidal waters by the Maine Department of Environmental Protection. Class B-2 and SB-2 waters are defined as being acceptable for recreational purposes including bathing, for industrial and potable water supplies after adequate treatment and for fish and wildlife habitat.

The study area lies in the coastal climatological division which is most affected by maritime influences and its average winter temperatures compare with those found 200 miles or more to the south. Average annual temperatures for the study area are about 45 degrees Fahrenheit and the average annual precipitation is approximately 42 inches.

Historical Flooding

A U. S Geological Survey stream gage is located at the head of the tidewater in Yarmouth. Records date back to October 1949. The largest flood recorded since the gage has been operational was on September 12, 1954. This flood occurred during Hurricane Edna when 7.49 inches of rainfall were recorded in

TABLE 1

BRIDGES ACROSS ROYAL RIVER IN YARMOUTH STUDY AREA

Station	Identification	Normal River Flow Elevation ft.msl	Bridge Deck Elevation ft.msl	Bridge Under-clearance Elevation ft.msl	Road Low Approach Elevation ft.msl	100YR Flood Crest ft.msl	Underclearance Relation to 100YR Flood above ft.	below ft.
194+50	State Route 88	0	21.5	18.5	20.8	15.0	3.5	-
177+50	Bridge Street	17.7	37.4	34.0	37.4	26.1	7.9	-
168+75	U. S. Route 1	36.9	58.7	54.9	58.7	42.4	12.5	-
139+25	Elm Street	71.0	80.8	76.6	79.8	76.9	-	0.3
130+50	Canadian Nat'l Railroad	71.0	85.8	78.5	85.8	77.2	1.6	-
123+75	Maine Central Railroad	71.0	94.3	83.3	93.1	80.0	3.8	-

TABLE 2

DAMS ON ROYAL RIVER IN YARMOUTH STUDY AREA

Station	Identification	Crest Elevation Feet msl	10 Year Flood Crest Feet msl	100 Year Flood Crest Feet msl	500 Year Flood Crest Feet msl
174+75	Lower Dam	36.8	41.3	42.3	42.8
141+75	Upper Dam	70.9	75.2	76.2	76.8

Portland in a 16-hour period. The discharge recorded was 7960 cubic feet per second (cfs). This discharge is approximately equivalent to the 100-year frequency flood discharge. The next highest discharge recorded was 5040 cfs on November 4, 1966. This discharge was assigned an eight-year frequency. The U.S.G.S. Water Supply Paper 798, "The Floods of March 1936" Part 1, New England Rivers, lists the estimated discharge at a dam in Yarmouth as 6370 cfs. This flood discharge was assigned a 25-year frequency.

Damage during the 1954 flood was quite severe to highways and bridges throughout the watershed. A majority of the smaller bridges were lost or damaged during the storm but have since been replaced by larger structures. Damages to commercial, residential and public utilities were isolated through the watershed. Flood water damages from the 1954 storm were estimated to be around $40,000 through interviews conducted by the Soil Conservation Service in 1965.

Although the largest flood recorded on the Royal River occurred during a hurricane, the U.S. Army Corps of Engineers in their report "Maine Coastal and Tidal Areas," House Document No. 151, states that the highest levels of tidal flooding along the Maine Coast have been caused by coastal storms (northeasters) rather than by hurricanes. The report further states that the record level of tidal flooding in the Portland area occurred on November 30, 1944, and on November 20, 1945, with a record high tidal elevation of 8.7 feet mean sea level. A high of 8.5 feet m.s.l. was recorded on December 20, 1959.

The seasonal distribution of floods for the State of Maine indicates that 33 percent of the floods occur in April, 12 percent each in May and November, 11 percent in March, with the rest of the floods distributed throughout the remaining months. One percent each of the floods occur during February and July.

Investigation Procedures

Physical data was obtained from U. S. Geological Survey Topographic Maps, and 25 surveyed valley, road and bridge cross sections based on mean sea level. Water surface profile determinations were made by Soil Conservation Se[illegible] Automatic Data Processing programs to establish elevation discharge relationships. Discharge-frequency relationships were established by analyzing the U. S. Geological Survey Stream Gage Records by the Log Pearson Type III method of analysis.

The stage-discharge relationships to the nearest 0.1 foot at each surveyed section were matched with the discharge-frequency relationships to prepare the high water profiles and approximate plan maps of the flood hazard areas. Frequency-analysis indicated that the 1954 flood would be essentially similar to the 100-year flood and therefore was not delineated separately on the maps and profiles.

The U S. Geological Survey 7.5 minute quadrangle maps along with the cross section survey data, steroscopic study and field checks, were used to delineate the approximate extent of flooding on the plan maps. The controlled plan maps were prepared from 1964 aerial photography at a scale of 1" = 1667'.

Study Results and Applications

This study reports high water profiles and flood hazard areas based on existing watershed land use and cover and on historical records. High water profiles are plotted for the ten-, 100-, and 500-year frequency floods. The extent of flooding created by these three selected flood events are also shown on the aerial photo mosaics.

For information about a specific location, refer to the aerial mosaic to determine the location of the nearest surveyed section and the general area affected. Then use the plotted high water profiles to determine the specific elevation. The safety of the location can then be determined by inspection, or, if necessary, by determining its mean sea level elevation. In areas where a particular flood line is not outlined in the flood hazard area, there is no measurable difference from the other flood line because of topographic relief.

In making computations, normal bridge flow conditions were assumed. No consideration was made for openings blocked by ice or other debris. The Elm Street Bridge and the Canadian National Railroad Bridge could become obstructed and allow flow over the road since water fills up the opening under flood conditions. Likewise, since the upper dam backs up water for a considerable distance, any change in its spillway will change the level of water at any one of the upstream bridges. Flood plain filling and other encroachments also affect the water surface profiles. Computations for this study considered only those features in the flood plain at the time field surveys were made. Future flood plain developments and modifications will require revised water surface profile computations.

The lower portion of the Royal River, downstream from the stream gage, is affected by the tide water. The following information on tidal waters for Portland which would be similar to Yarmouth was obtained from the U. S. Army Corps of Engineers and the National Oceanic and Atmospheric Administration

Event	Elevation feet-msl
High Tide of Record	8.7
Mean High Tide	4.5
Mean Spring Tide	6.7

These elevations do not take into account any wind or wave surge effect which could result in a much higher elevation. Flood frequency relationships have not been developed for any coastal areas in Maine but the

TABLE 3

SELECTED FLOOD DISCHARGES

ROYAL RIVER - YARMOUTH

Location	Valley Cross Sections	Drainage Area Square Miles	Estimated Peak Discharge in cubic feet per second (cfs) 10-year	100-year	500-year
Watershed Outlet	I-95	142.0	5430	7930	9800
to US 1	1 to 10	140.0	5430	7930	9800
to old mill site	11 to 12	139.2	5410	7910	9780
to Canadian National Railroad	13 to 20	138.6	5400	7890	9750
to power line	21 to 24	138.0	5390	7880	9730
above town line	25	136.4	5350	7820	9660

100-year tidal flood can be expected to be higher than the high tide of record.

Major changes of bridge openings, valley cross-sections, or dam spillways will affect flood levels and necessitate updating the information given in this report. Additionally, major changes in land use and cover due to accelerated development could cause a significant change in flood levels and require revisions of the flood lines.

Flood plain soils information for the study area is not presented in this report since the Cumberland County National Cooperative Soil Survey Report is being published and will soon be available. Engineering Survey Data and the hydrologic and hydraulic computations were organized to allow future reference and use as needed. They are on file with the Soil Conservation Service, USDA Office Building, University of Maine, Orono, Maine 04473.

Glossary of Terms

Bridge underclearance or low chord - The elevation of the point where the girders first begin to reduce the flow area of the channel.

Bridge deck - The elevation of the road centerline at the lowest end of the bridge.

Flood - An overflow or inundation onto land areas not normally covered by water and that are used or usable by man Floods are usually characterized as temporarily inundating land areas which are adjacent to a body of water such as an ocean lake, stream, river, or other body of water. Adverse effects may include loss of life and property from overflow of land areas, backup of sewers and storm drains, creation of unsanitary conditions or other unfavorable situations by deposition of materials or minerals in stream channels or water supplies during flood recession, loss of bridges, roadways and public utilities, the deposition of debris and sediment on the overflow areas and other problems.

Flood crest - The maximum stage or elevation reached by the waters of a flood at any location.

Flood peak - The maximum instantaneous discharge of a flood at a given location usually occurring at the flood crest.

Flood plain - The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake, or other body of standing water which has been or may be covered by floodwater.

Flood profile - A graph showing the relationship of water surface elevation and channel bottom elevation to the location. It is generally drawn to show the surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Frequency - An expression or measure of how often a hydrologic event of given size or magnitude should, on an average, be equaled or exceeded

(a) A 500-year frequency flood should be equaled or exceeded in size, on the average, only once in 500 years. It has a 0.2 percent chance of being equaled or exceeded in any given year

(b) A 100-year frequency flood should be equaled or exceeded in size, on the average, only once in 100 years. It has a 1 percent chance of being equaled or exceeded in any given year. However, it could occur two or more times in any year

(c) A 10-year frequency flood should be equaled or exceeded in size, on the average, only once in 10 years and has a 10 percent chance of being equaled or exceeded in any year.

Head - The height of water above any plane or reference

Head loss - The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Left bank - The bank on the left side of a river, stream or watercourse looking downstream.

Right bank - The bank on the right side of a river, stream or watercourse looking downstream.

Road low approach - The elevation of the point where water starts flowing over the road. This may or may not be the same as the bridge deck elevation.

Valley cross section - The vertical and horizontal configuration of a valley normal to the direction of water runoff. It is generally composed of the left flood plain, channel segment(s), and the right flood plain including any islands within the normal channel.

Section 18. This section is located between the Canadian National Railroad Bridge and the Elm Street Bridge. Profiles show the 10-year flood to be at an elevation of 75.6 feet m.s.l., 0.5 feet below the bottom of the rod. Water would surround the back of the water district building during the 100-year and 500-year floods.

Section 15. This is the right abutment of the upper dam. The elevation at the base of the rod is 73.1 feet m.s.l. The lowest spot on the spillway of the dam is at the center at an elevation of 70.9 feet m.s.l.

100 YR

Section 4. This section is located at the stream gage showing the Route 88 bridge and the Interstate 95 bridge in the background in tidal waters downstream. The elevation at the top of the well is 19.0 feet m.s.l. (2.2 on the rod). The 100-year flood elevation is at the base of the rod while the 10-year flood elevation would be 1.2 feet below that at an elevation of 15.6 feet m.s.l.

Recovered Bench Marks in Study Area

Designation: F 5 = 92 (U.S.G.S.)
Character of Mark: A U.S.G.S. DISK 1/
ELEVATION: 91.689 feet m.s.l.
Detailed Description: About 0.4 mile southwest along the Maine Central Railroad from the crossing of the Canadian National Railway at Yarmouth Junction, about 0.15 mile southwest of the crossing of Sligo Road, at the bridge over the Royal River, 12.0 feet northwest of the northwest rail, 2½ feet below the level of the track, and set in the top of the northwest end of the southwest stone abutment of the bridge.

1/ The disk was previously shown as being stamped 92 however the stamping is no longer legible.

Designation: Z163
Character of Mark: A C&G.S. Bench Mark Disk on Steel Rod Stamped Z163 1966.
ELEVATION: 90.978 feet m.s.l.
Detailed Description: At Yarmouth Junction, near the crossing of the Maine Central Railroad and the Canadian National Railway, 106 feet northwest of the center of the crossing, 104.0 feet north of the north rail of the Maine Central Railroad, 33.0 feet west of the west rail of the Canadian National Railway, 43.5 feet southeast of the southeast rail of a connecting track, 2½ feet north of a telephone pole, 1.0 foot east of a metal witness post, about level with the track and is a disk on a copper coated steel rod flush with the ground and protected by a 4-inch iron pipe flush with the ground. The rod was driven to refusal at a depth of 71.0 feet.

Designation: RM1
Character of Mark: A U.S.G.S. DISK STAMPED GAGING STATION
ELEVATION: 10.93 feet m.s.l.
Detailed Description: At Yarmouth, 50' downstream from U.S.G.S. stream gage house near edge of river, a standard brass tablet in point of ledge which sticks out in river. Disk and ledge are visible only during periods of low flow.

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

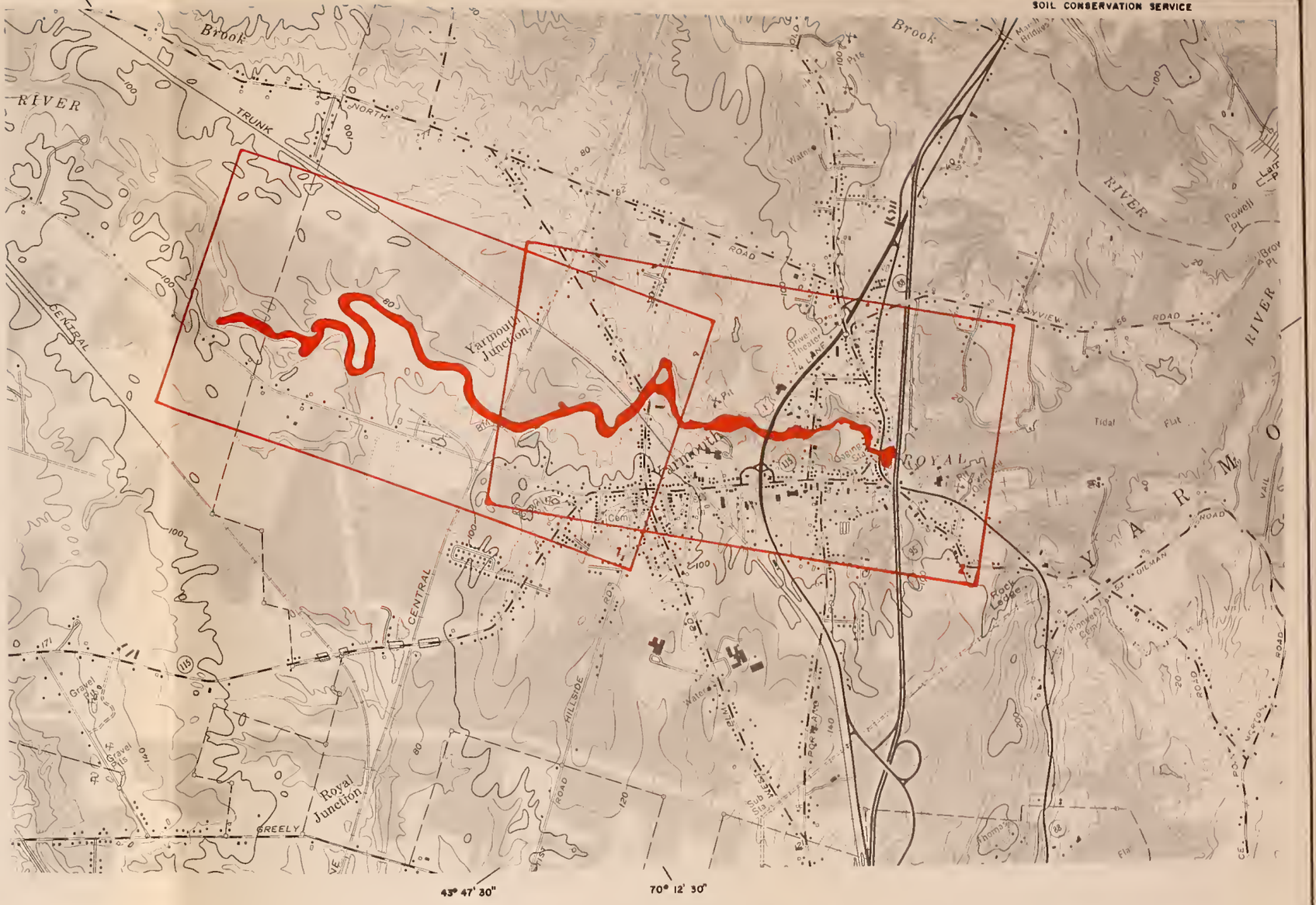
KEY TO LOCATION

LEGEND

TOWN LINE

FLOOD HAZARD STUDY AREA

RED OUTLINE INDICATES SHEET COVERAGE – RED NUMBER INDICATES SHEET NUMBER



SCALE 1:24000

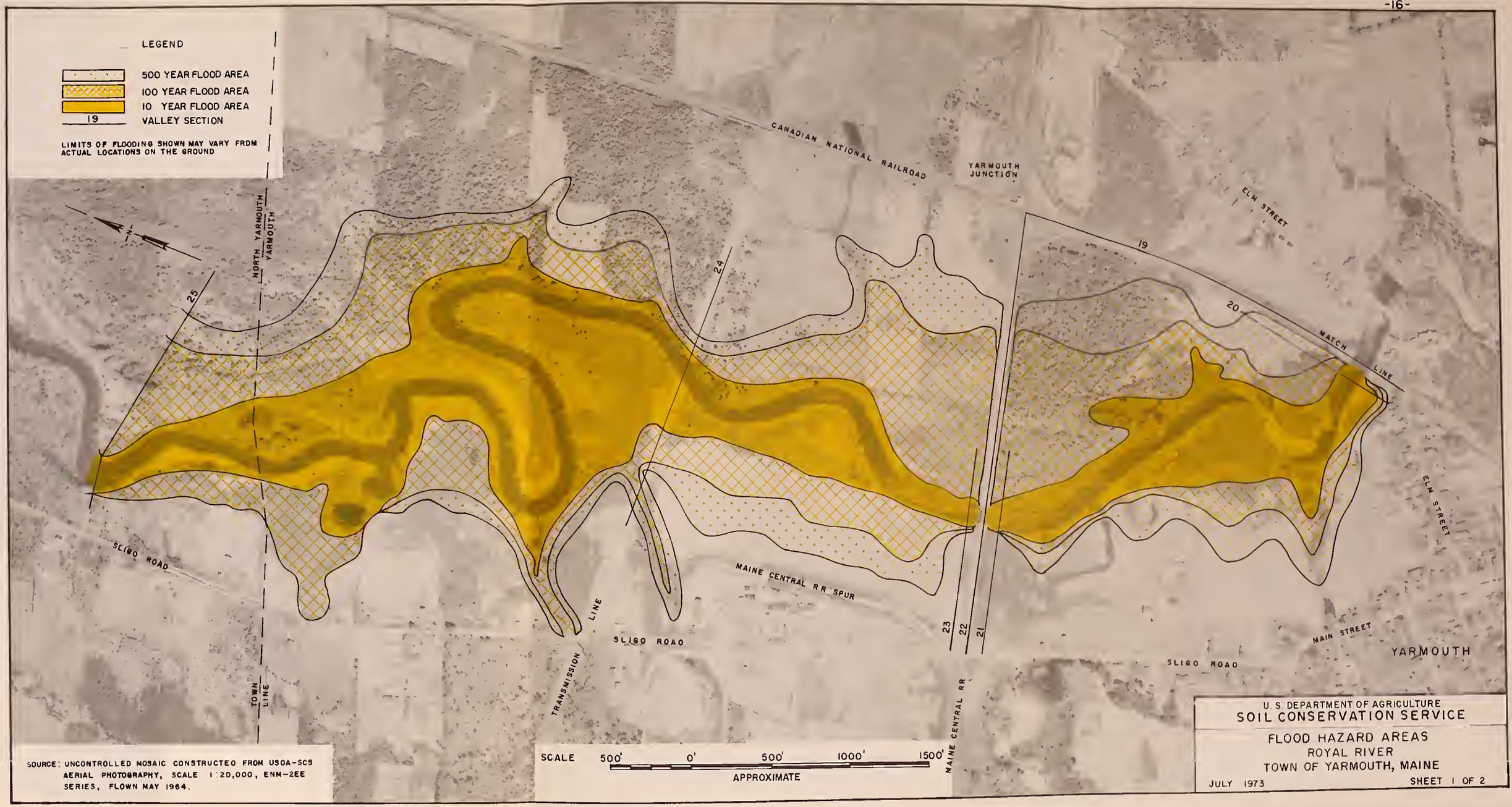
0 1/2 1 MILE

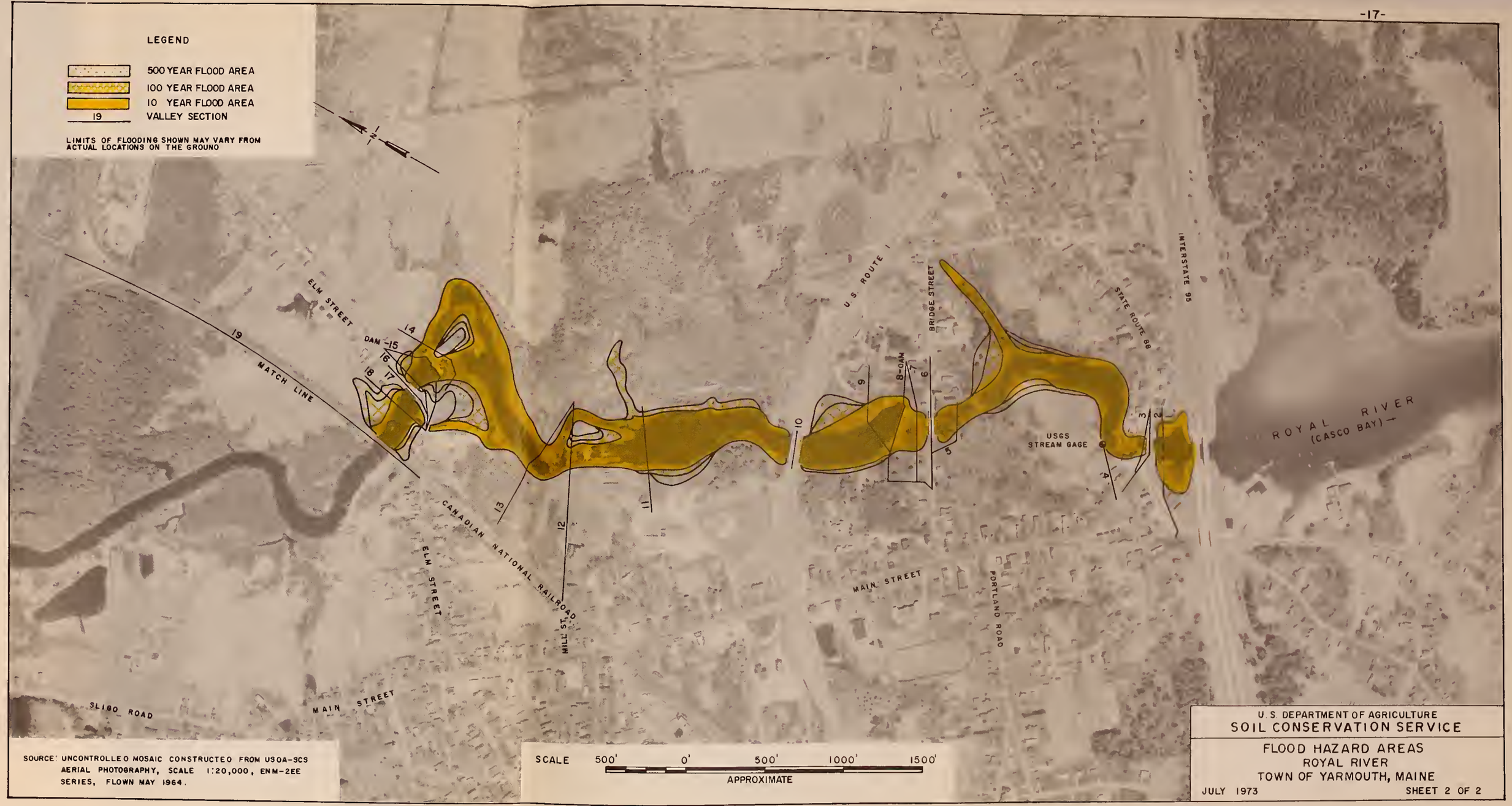
SOURCE
USGS 7½' YARMOUTH, MAINE, QUADRANGLE

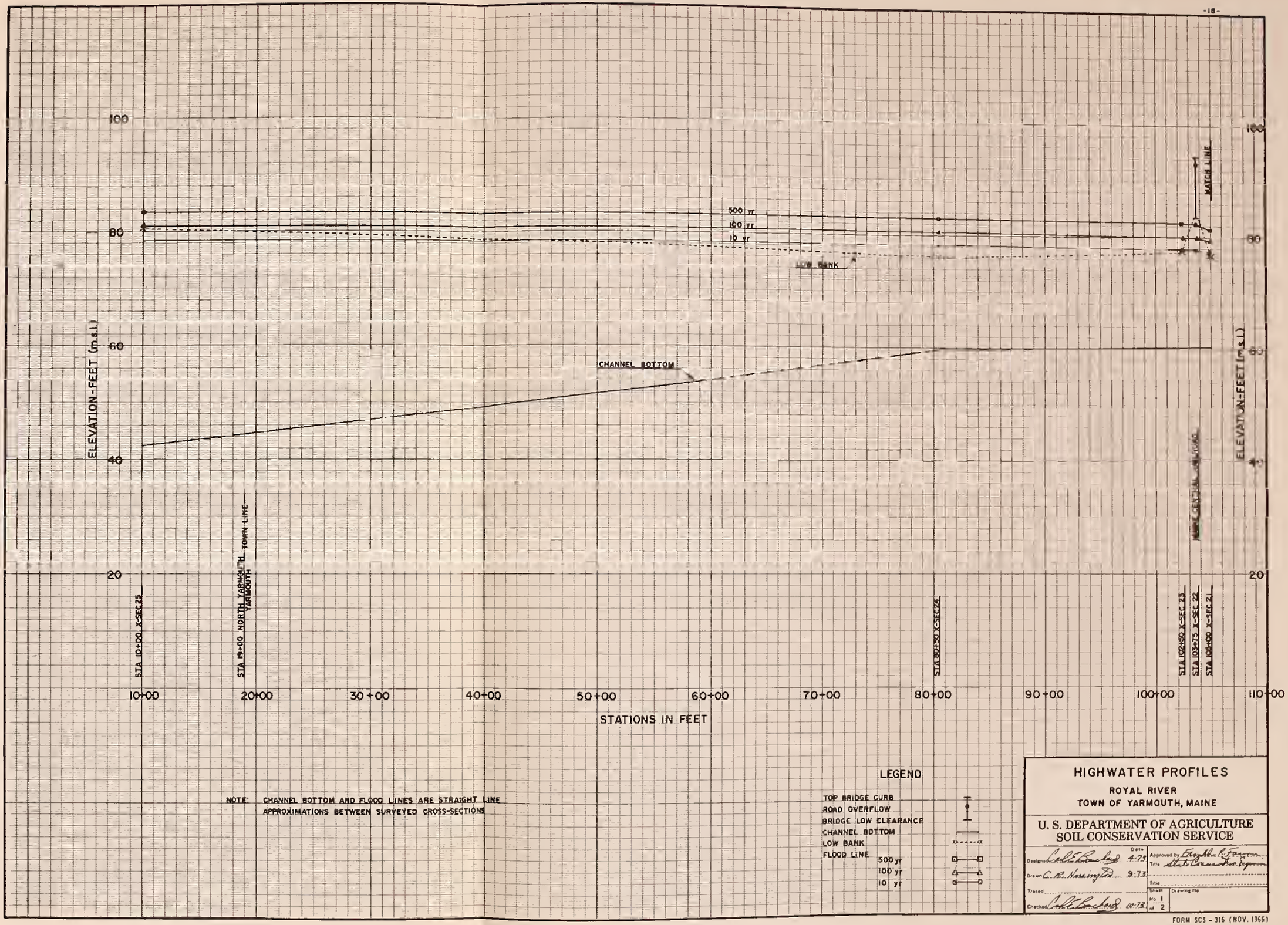
STUDY AREA AND INDEX TO FLOOD HAZARD AREA MAPS

ROYAL RIVER

TOWN OF YARMOUTH, MAINE


LEGEND
500 YEAR FLOOD AREA
100 YEAR FLOOD AREA
10 YEAR FLOOD AREA
19 VALLEY SECTION
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND
CANADIAN NATIONAL RAILROAD
YARMOUTH JUNCTION
ELM STREET
NORTH YARMOUTH
YARMOUTH
MATCH LINE
SLIGO ROAD
MAINE CENTRAL R R SPUR
TRANSMISSION LINE
TOWN LINE
MAIN STREET
YARMOUTH
MAINE CENTRAL RR
SCALE 500' 0' 500' 1000' 1500'
APPROXIMATE
SOURCE: UNCONTROLLED MOSAIC CONSTRUCTED FROM USDA-SCS AERIAL PHOTOGRAPHY, SCALE 1:20,000, ENN-2EE SERIES, FLOWN MAY 1964.
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD HAZARD AREAS
ROYAL RIVER
TOWN OF YARMOUTH, MAINE
JULY 1973
SHEET 1 OF 2


LEGEND
500 YEAR FLOOD AREA
100 YEAR FLOOD AREA
10 YEAR FLOOD AREA
19 VALLEY SECTION
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND
ELM STREET
DAM
MATCH LINE
CANADIAN NATIONAL RAILROAD
MILL ST.
ELM STREET
SLIGO ROAD
MAIN STREET
U.S. ROUTE 1
BRIDGE STREET
8-DAM
USGS STREAM GAGE
MAIN STREET
PORTLAND ROAD
STATE ROUTE 88
INTERSTATE 95
ROYAL RIVER (CASCO BAY)
SOURCE: UNCONTROLLED MOSAIC CONSTRUCTED FROM USDA-SCS AERIAL PHOTOGRAPHY, SCALE 1:20,000, ENM-2EE SERIES, FLOWN MAY 1964.
SCALE 500' 0' 500' 1000' 1500'
APPROXIMATE
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FLOOD HAZARD AREAS
ROYAL RIVER
TOWN OF YARMOUTH, MAINE
JULY 1973
SHEET 2 OF 2



NOTE: CHANNEL BOTTOM AND FLOOD LINES ARE STRAIGHT LINE APPROXIMATIONS BETWEEN SURVEYED CROSS-SECTIONS

LEGEND

- TOP BRIDGE CURB
- ROAD OVERFLOW
- BRIDGE LOW CLEARANCE
- CHANNEL BOTTOM
- LOW BANK
- FLOOD LINE
  - 500 yr
  - 100 yr
  - 10 yr

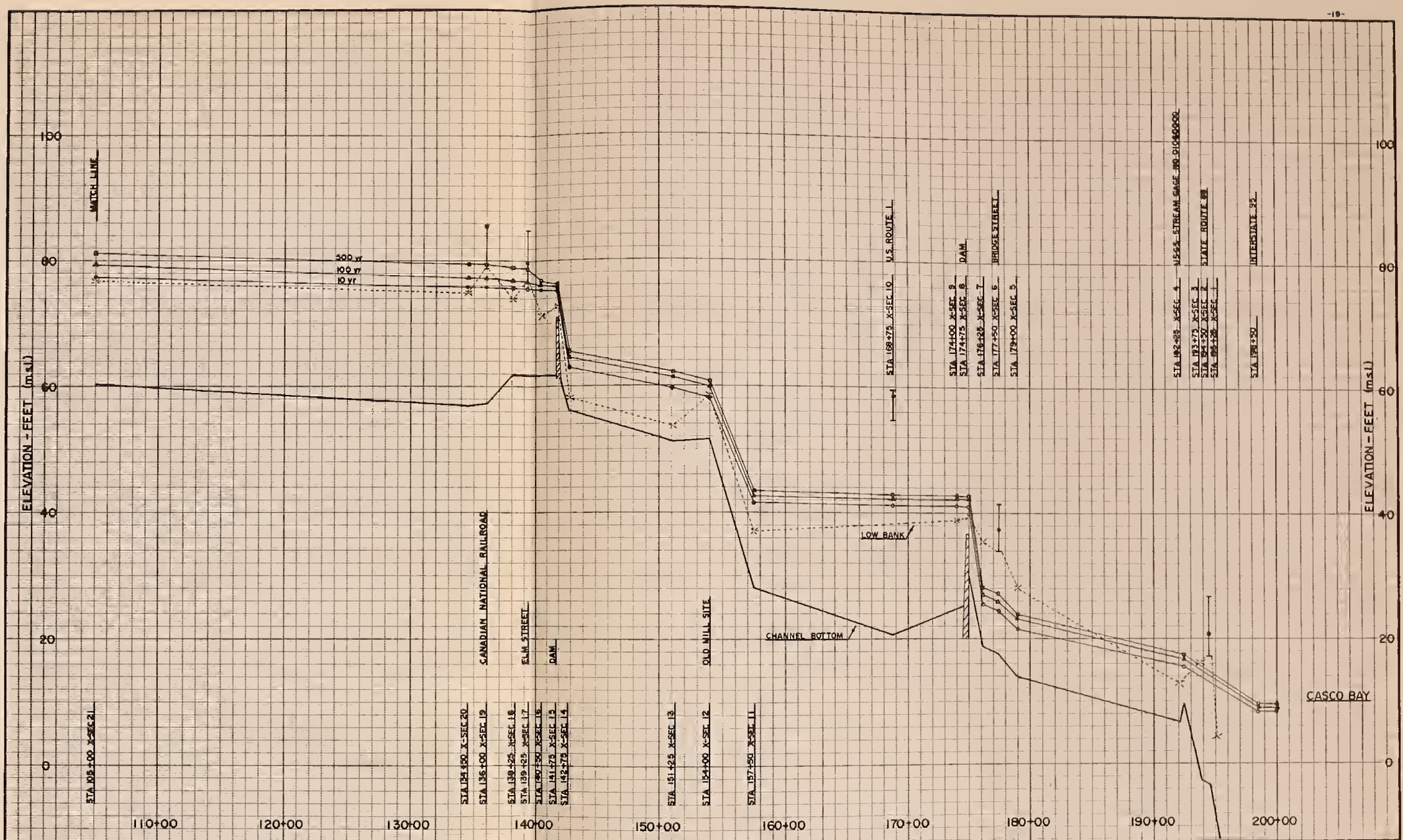
HIGHWATER PROFILES

ROYAL RIVER
TOWN OF YARMOUTH, MAINE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed Carl E. Rowland	Date 4-73	Approved by Stephen R. Fagan	
Drawn C. R. Harrington	9-73	Title State Conservationist	
Traced		Title	
Checked Carl E. Rowland	10-73	Sheet No. 1 of 2	Drawing No.

FORM SCS - 316 (NOV. 1966)



NOTE: CHANNEL BOTTOM AND FLOOD LINES ARE STRAIGHT LINE APPROXIMATIONS BETWEEN SURVEYED CROSS-SECTIONS

LEGEND

- TOP BRIDGE CURB
- ROAD OVERFLOW
- BRIDGE LOW CLEARANCE
- DAM
- CHANNEL BOTTOM
- LOW BANK
- FLOOD LINE
  - 500 yr
  - 100 yr
  - 10 yr

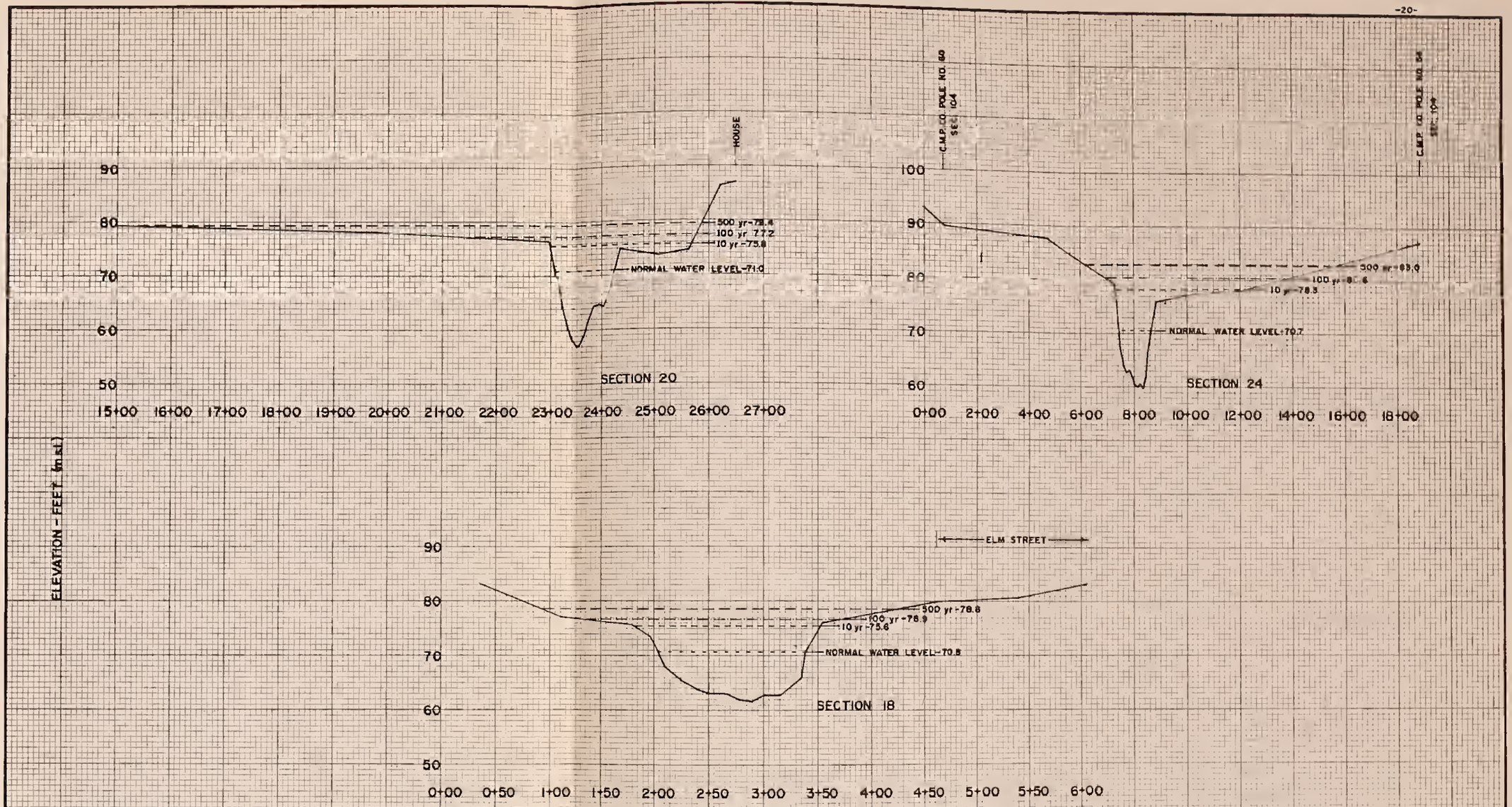
HIGHWATER PROFILES

ROYAL RIVER
TOWN OF YARMOUTH, MAINE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed Carl E. Bouchard	Date 4-73	Approved by Frank H. Fenn	
Drawn C. R. Hannington	9-73	Title State Conservationist	
Traced		Title	
Checked Carl E. Bouchard	10-73	Sheet No. 2 of 2	Drawing No

FORM SCS - 316 (NOV. 1966)



NOTE: CROSS SECTIONS SURVEYED LEFT TO RIGHT LOOKING DOWNSTREAM

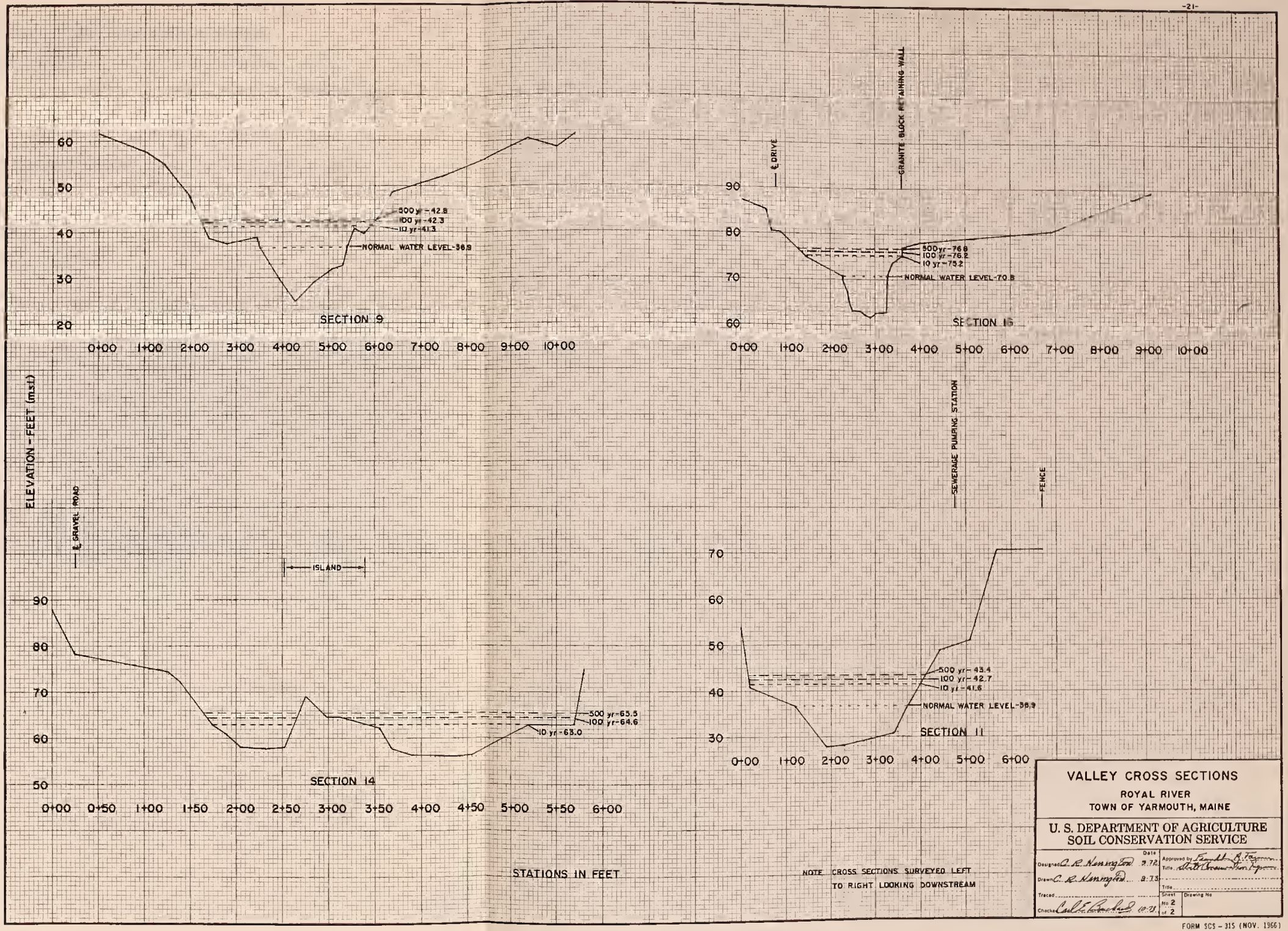
VALLEY CROSS SECTIONS

ROYAL RIVER
TOWN OF YARMOUTH, MAINE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date	Approved by
Designed C. B. Harrington	9-72	Title State Conservationist
Drawn C. B. Harrington	9-73	Title
Traced		Sheet No. 1 of 2
Checked Carl E. Bachand	11-73	Drawing No.

FORM SCS - 315 (NOV. 1966)



VALLEY CROSS SECTIONS

ROYAL RIVER
TOWN OF YARMOUTH, MAINE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed C. R. Hemingway	Date 2-72	Approved by Everett A. Jacques	
Drawn C. R. Hemingway	2-73	Title State Conservationist	
Traced		Title	
Checked Carl E. Bachelder	10-21	Sheet No. 2 of 2	Drawing No.

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Washington, D. C. 20250

APR 10 1974

SUBJECT: RB - Royal River, Town of Yarmouth, Main - Flood Hazard Analyses Report

TO: Dr. Joseph F. Caponio
Acting Director
National Agricultural Library

The attached copy of the subject Flood Hazard Analyses Report is for your information and use.

This study was made at the request of the involved local unit(s) of government. It was carried out under the authority of Section 6 of Public Law 83-566, in accordance with (1) Executive Order 11296, (2) House Document No. 465, 89th Congress, 2nd Session, especially Recommendation 9(c), "Regulation of Land Use," and (3) the Joint Coordination Agreement with the state agency responsible for flood plain management activities. The purpose of the study was to make flood hazard and land use information available to the local government(s) and citizens so as to encourage land use appropriate to the degree of hazard involved.

The Soil Conservation Service's objective in developing this technical data is to help reduce present and potential flood damages through wise utilization of flood plain lands, thereby improving the health, safety, economy, and environmental conditions of the community.

Kenneth E. Grant

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Administrator

Attachment

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Washington, D. C. 20250

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